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ABSTRACT

The problem-oriented medical record, developed by Lawrence L. Weed, M.D., involves an interactive computer system and has been operational on two wards at the University Hospital in Burlington, Vermont, a teaching hospital. The Problem-Oriented Medical Information System (PROMIS) consists of terminals that feed into the central memory units; the terminals can be wheeled to the patient's bedside. Displays indicate first the common and then less common diseases that can be attributed to the patient's symptoms. Other displays logically lead the physician to a treatment plan through references from the medical literature and other considerations. The system also maintains problem-oriented progress notes. The system is designed to educate a new physician and other health practitioners who are patient-centered, team-oriented, and who relate to patients as mutual participants. Physicians must be trained and educated differently under this system. Under a restructured medical curriculum, it should be possible to train more people for less expense. The system creates conditions under which medical care can become coordinated in its delivery and potentially less costly both because tests are not done unless absolutely necessary and because the physician is warned not to do something in treating one problem that will complicate another. To the extent that "experts" create guidance tools that other members of the health team can use, costs can be lowered. The present system of provider-centered health care will be restructured to be patient-centered if the PROMIS system is accepted by the medical community. (SW)

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A MEDICAL REVOLUTION THAT COULD...: THE WORK OF THE PROMIS LABORATORY AND LAWRENCE L. WEED, M.D.

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

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September 29, 1978

EXECUTIVE SUMMARY

If national health insurance is ever to become a reality, there are many questions about both costs, and cost control that need to be answered. In addition, ways to make physicians and other health care providers more accountable for their actions must be found.

This position paper (written for publication in a popular journal) describes an operational computerized medical guidance system created by Lawrence L. Weed M.D. and the PROMIS Laboratory in Burlington Vermont. It suggests that this system can create a maximally cost-effective and accountable health care delivery system.

Dr. Weed has made all this possible by designing a new system of structuring and keeping medical records. Traditional records are source oriented--that is they are ordered according to whomever provides them. The physician's notes are on the first page, the nurse's on the second page, laboratory and pharmacy reports on succeeding pages and so on. Weed had long ago noted the serious problems of logic and coordination in patient care that such a system causes. To overcome these problems, he originated the Problem Oriented Medical Record (POMR) where all provider actions are listed under the medical problem to which they apply. Symptoms, diagnoses, treatment and progress notes, are logically structured to show how they focus on a particular patient problem.

Such record keeping has given medical care, for the first time, a logical, well defined structure, one to which computers could be applied. Since 1970, Weed's medical team has been working on putting medical knowledge into computer memory banks. Terminals with touch sensitive CRT's now contain 37,000 interlocking and branching displays of medical knowledge, with up to 600 characters per display. The displays are designed in such a way that physicians can follow a structured pathway of information like a road map in providing patient care.

In helping to avoid tests that may not be necessary, the PROMIS system holds down costs. Furthermore, whenever a procedure or medication is ordered, the cost of such action is indicated on the screen. As a result, the hospital billing becomes a by-product of the physician's analytical treatment, because the terminals make the same record automatically retrievable in the billing office as well as on the patient ward. In every case patients and health care providers alike can see, at a glance, the expense of treating each problem on the patient's list. Cost studies and patient population studies become possible by simple electronic manipulation of the data base.

The PROMIS system can ensure accountability because it creates patient records in electronic form, retrievable at any future time. When a health care provider takes an action to diagnose or treat the patient, such an action can be taken only by entering the provider's name into the record as a "signature" for the action. The date and exact time of entry are automatically noted.

Dr. Weed's work means that the practice of medicine, where the computer system is available, need no longer be memory dependent. This, in turn, has profound implications for the ways in which we now educate our health care providers, and for those who can become health care providers in the first place. It is extremely unfortunate that his work, while widely known in the medical community, is unknown among the public at large.

It is time to test what he has done on a larger scale to ascertain its potential for making national health insurance into a viable reality.

A MEDICAL REVOLUTION THAT COULD...: THE WORK OF THE PROMIS LABORATORY AND LAWRENCE L. WEED, M.D.

Dr. Lawrence L. Weed is the originator of a new way of looking at medicine. He has developed a world-view which calls for logical and precise thinking within a well-structured framework. To implement his vision he has developed a new kind of record keeping: the problem oriented medical record (POMR). At first thought this may not be so striking, but when one stops to realize that all that medicine aspires to do, all its thought processes, its structure and its logic are contained in the medical record, it's possible to begin to understand why changes in the method of record-keeping become tantamount to changes of the entire system.

Traditionally medical students are taught to collect patient symptoms in a piecemeal fashion. Synthesis of the interrelationships between the pieces is left entirely to their judgement. Having heard the patient's complaints, they are rewarded for being able to make a quick and, by the surface facts, correct hypothesis of a disease that the patient's symptoms could indicate. They are then shown how to order tests to rule out the disease. They have to do all this in a context where, relying on memory alone, it is extremely difficult to calculate what will be the least risky, most effective and least expensive test. If the tests confirm the diagnosis, then the physician has proven his "genius" by guessing right the first time. However, if they do rule it out, the physician and patient have become victims of the traditional medical system. The physician must reexamine both the facts and his hypothesis to come up with another disease toward which more expensive time and tests can be directed in order to rule it out. And so on, and on, and on!

The problem-oriented record has indeed changed the ballgame. It seeks to reward, not educated guesswork, but structured thinking within a system having well-defined rules and goals. It gives those physicians, who

are willing to go to the trouble of using it, a way of solving the first great problem of modern medicine: the need to bring order and logic into the chaos created by our disastrously complex and uncoordinated health care system. And, as Larry said to me, "once you have a system with agreed upon rules, structure, and logic, you can let the computers begin to roll. They work very well within logic and structure and can remember so much more than the human brain."

Since 1970, only two years after he first explained the concept of problem-oriented medical records to the medical world in a major journal, he has been letting the computers roll at the University of Vermont Medical School where he is a member of the teaching faculty. Computers are solving for Larry Weed and his colleagues and, some day, given solutions to political problems, may solve for the American people the second major problem of modern medicine: the knowledge explosion. The complexities and subtle interrelationships between diesaes and the human body, which may harbor many problems (commonly as many as six to ten), have given rise to a medical literature, the most recent five years of which, would take a large library to house. The human memory can never store more than the most minute fraction of this knowledge. Computer memory banks, becoming ever smaller in physical size, can store it all. They can be ready to send from the entire library of medical knowledge, in a quarter of a second, the exact "page" for which the doctor is searching.* The "page" is then received on the television screen in his office or on the hospital ward.

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* The input required from the physician is an ability to follow a logical pathway and structure in order to progress from one "page", or level of information to the next.

Thus, though it takes the breath away to say it, Larry Weed, and a small medical team* have, for the past eight years, been working at the task of creating a structure of logic and information that can accomodate the world's medical knowledge. This structure will permit the knowledge to be used in an integrated and coordinated way. Working with a set of computers housed in the basement of a doctor's residence at the University Hospital in Burlington, Vermont, the team has created an interactive system into which it has already fed a sizable part of the world's medical knowledge.

What these dedicated individuals have built is called the Problem-Oriented Medical Information System - PROMIS for short. Having been operational on two different wards in the teaching hospital for the past seven years, it continues to grow ever more sophisticated. The system consists of several dozen portable terminals which feed into the central memory units. In using PROMIS, a terminal is wheeled to the patient's bedside. By means of a touch-sensitive screen, the patient, assisted by a nurse, begins to write the medical record. The patient's history or data base is the first information to be collected. "Have you ever had this or that?" Short answers to one hundred and seventy five or so questions are requested.

Next the physician reviews the patient data base. In discussion with the patient, he formulates the problems, all the problems; physiological, emotional, social, and economic, which may be affecting the patient's health. The doctor, as he asks the patient questions, begins to work down a branching pathway of logical displays. Suppose the complaint is abdominal pain. The doctor touches this on the screen and while "abdominal pain" is written into

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* Donna Gane, R.N.; Brian Ellinoy and Genevieve Gilroy, pharmacists; four medical librarians and a team of computer programmers headed by Steve Cantrill.

the patient record at the screen's top, while a new display: "problem descriptors and associations" appears. This reminds the doctor to ask about "the severity," "the duration," "relieved by," "made worse by," or "associated with." Suppose he touches "associated with." These words become part of the patient record and a new display reading "associated with": "symptoms," "problems," "concurrent medications," "social-environmental problems," "genetic factors," etc. appears. What the doctor touches becomes a part of the patient's record and leads to the next layer of questions. The patient answers the question, the doctor touches the screen and the two progress as a team down the roadway provided by the computer memory. The whole process is designed so as to tell the physician very explicitly all the information he should get on the problem "abdominal pain." The tool that he uses to do his work shows him how to do it well. Furthermore, since others use the same tool to access the same patient records, the process of coordination in the delivery of medical care is greatly enhanced.

Once all this has been done, there are displays which will indicate the common and then the less common diseases that can be attributed to the patient's symptoms. The physician no longer thinks of a single disease and then orders a whole series of expensive tests to rule it out before going on to the next disease. The displays provide him with a logical pathway on which to proceed further in order to rule out certain disease possibilities by asking the right questions. Later, when he is ready to think about the characteristics of a specific disease, the display provides the detailed descriptive physical and laboratory parameters of the disease. Many displays have terms followed by "def." Touch "def" and a precise definition of the term appears on the screen. Finally, there will always be some instances where even the best thinking can go no further and a test or series of tests is needed to make a definite diagnosis. In such a case, full information

about all the options abailable to doctor and patient, and the exact cost of each, appears on the screen.

Of course patients are likely to have several problems, each of which may interact with and affect the others. Treatments given for one may make another worse. Here too, the displays are linked so that the physician gets precise information in all of these areas. He can find out how individual problems add up to indicate larger problems. He can make priority judgments. Which problems are the most serious and demand action now and why? All the time he is writing, in an electronic form, a patient record which can be retrieved months, or years later. His whole pattern of treatment is available for audit at any future time. If he uses the system conscientiously, he will have done his work correctly and will have a record to prove it. He won't have forgotten anything because the computer won't let him forget it. This gives us a tool whereby malpractice caused by a lapse in memory on the part of an otherwise well-intentioned physician need never occur.

Having studied the patient's data base, and having formulated the patient's problems, the physician's next step is to write a treatment plan for each problem. Here too, the displays are set up to lead him logically. With almost any given problem, the display will add the latest references from the medical literature on the disease, ways to treat it, side effects to watch for, and so on. Four medical librarians work full-time indexing the contents of about 5,000 articles per year from eighty-eight major medical journals. The computer members of the PROMIS team then input the librarians' work into the system.

The final stage in the system's use is the maintenance of problem oriented progress notes. These notes are contributed by all members of the

health care team, the registered nurse, the LPN, the radiologist, the physician, and so on. Patient vital signs, or other patient problems that are being monitored daily, or several times daily, are entered via the terminal keyboard into the record. The system has the capacity to check each patient record and graph data on patient temperature, blood pressure or virtually anything else over a day-to-day period or even within a 24-hour period. All members of the health care team have access to the patient record. Each can see what the other has done, or hasn't done. Lapses in the care given by one member of the team can be spotted by another, merely by reading the record.* For the first time the complex process of modern medical care can be coordinated. The knowledge of the best minds of modern medicine is available to every physician who uses the system. The system users stand on the shoulders of their predecessors instead of groping blindly in the dark. The physician, freed from the impossible task of memorizing a huge body of knowledge, can go on to sharpen his analytical and decision-making abilities. Assuming the physician uses the tool properly, and assuming that effective leadership is asserted, the patient can be getting the best care possible, care that for the first time is scientific in its structure and delivery.

Larry Weed would be the first to agree that words cannot adequately convey the complexity and sophistication of the system that is startlingly simple to use. Recently I spent eight hours, spellbound before the PROMIS monitor screens, watching the green glow cast by the pages of medical logic and personal history that marched in precision on and off the screen. There is no other word to describe it but awe-inspiring. It casts a spell on those

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* This is the source of one of the political problems created by the PROMIS system. A physician's actions have never before been immediately "on record" for all other health care providers to observe. Some physicians resent this "intrusion" on the part of lesser members of the health care team.

who see it and begin to comprehend what it can do. Weed's team of about a dozen people have built, in eight years, some 37,000 interlocking displays. Hundreds more are being added every month.

Later that night at his house, caught up in his contageous enthusiasm, Larry turned to me and said: "The power of the tool, Gordon. Do you understand what it can do? How it can increase the speed and the accuracy of decision-making, preventing lapses in logic that so often cost patient lives. And the beautiful thing is that it's getting more and more powerful all the time. In helping us to do our work, it allows us to couple the uniqueness of individual patient needs to the massive complexity of medical knowledge."

All this is no small accomplishment. But it is only half of Lawrence Weed's message to the world. For, if the practice of medicine need no longer be memory-dependent, indeed, should no longer be memory-dependent, then certain very important premises for medical education and possibly education in general follow. They all go right to the heart of the question of what a good doctor is.

Larry clearly enjoys himself when he asks an audience whether they'd rather be treated by a physician who graduated first in his medical school class but is too lazy to take a call from his nurse at two a.m. or by one who had average grades but was always conscientious about being available to his patients. "None of us," he smiles, "in the present paradigm, where grades are considered all important, would want to be treated by a B or C cardiologist. Yet, under the present system, that's what most of us get and we'll never know the difference because the doctors don't have to show us their grades."

What all of this appears to indicate is that grades and competent performance have nothing to do with one another. While grades measure

memory and retention of facts at a given point of time, they generally have nothing to do with an individual's ability to do thorough, reliable, sharply analytic and efficient work in a real-life setting. Nevertheless, our educational system still reasons that we have to know the facts before we can function on the job. It has been decided that schools will teach us the facts and the job will somehow take care of itself. Maybe this is why we hear so many wisecracks about the difference between life--in the ivory tower and in the "real world."

In medicine the PROMIS system has opened the door to the possibility of radical educational change. According to Larry there is no longer any need for the first two years of medical school that are spent in the brutal memorization of massive textbooks, isolated from the hospital, the wards and everything having anything to do with patient care. Any medical school having the PROMIS system would be able to train first-year students in its use. They might still have other classes but, right from the first, the majority of their time would be spent on the ward learning to use the computer system and to become proficient in the use of physical, hands on, skills.

In a talk given at the Educational Testing Service this spring, Larry described what this process would be like:

> I say to my students, "You'll not write impressions. You will write the problem at the level you understand it. The first basic problem list, which will be all the abnormalities in the data base, is something a technician can do. The blood pressure was high. The uric acid was high. She has a big liver, swollen ankles, complains of a headache. And then you put them all together to higher levels of abstraction, as long as you can support what you are doing with evidence. But don't you dare go a step beyond what you can support. The dumbest student will have twenty problems, the assistant professor might get it down to ten, the full professor to four. And it cannot go below that because the urinary tract infection is completely separate from the alcoholism, and the migrain headaches. But we are not going to leave the swollen ankles, the big liver and the big heart separate. These all add up to heart failure."
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> So I say, "No two problem lists will ever be the same. The lists will depend on your level of sophistication. But they will always be defensible. There will always be evidence and it will always be logical. Now you see what I'm teaching to elicit. I am teaching a core of behavior."

I say, "I'm going to have a matrix on each of you people and there's going to be a data base which you're going to get. It's going to be well-defined. And there's going to be a list of problems. Then you're going to write a plan for each problem. Each plan will be numbered and titled with respect to that problem. No more of these medical charts where the progress notes and order sheets read: morphine, ivp, patient's not doing well today...going home tomorrow, nurses notes over on the back here...comfortable night...vomiting, then a laboratory section: orange sheet; serums, sodium, potassium. They file things according to the source. There's no logic. You don't know why they did it. You say to them, you've got all the x-rays together on the grey sheet. Why do you do that? Well, they say, they all come up from the x-ray department at five o'clock, and the technician always puts them in that section of the record."

"But," I said, "you can't source orient the data, you've got to problem orient the data. You will never write another order without telling me the problem. From now on every progress note must have a number and title with respect to the problem and then it will be S.O.A.P. You will 'soap' every note. You'll tell me subjectively: number one, the hypertension. How does the patient feel about it? Then objectively: What do you have? What was the blood pressure? What was the b.u.n.? And then assess the data. What's your opinion? And finally,what's your plan for the next steps to be taken. I want to know those things. I don't expect you to do precisely what I would do, or what you memorized in that course. But, I do expect that whatever you do you can logically defend. So now, there's going to be plans that are numbered and titled and there's going to be progress notes. And, for each plan, there's going to be: 'data base, problem formulation, plans and progress notes' down one axis and 'thoroughness reliability, analytic sense and efficiency' down the other axis. We will divide each of the four categories into its four parts, creating sixteen boxes. And you're each going to have cards with these sixteen boxes and you'll carry them in your pockets."

So we took half the students in a class as they came on a service and said, "we're going to look at you this way instead of the way in which we used to. We will never ask you what you know again. No exams. We will show you what good care is. The data base should be complete. We will ask you if you got it. If you didn't, you're not thorough. You get an F in thoroughness. It 's that simple. You said you were going to do a rectal and you didn't do it. Put an F in that box for today."

Or what about reliability? Yes, you were thorough. You got a P in thoroughness. You did the rectal but I checked your work and found a nodule in the prostate, a nodule hard as a rock. So you get an F in reliability.

Or I read the plan you wrote on that big liver. You put as a problem hepatomegaly "big liver." And your plan is to rule out hemachromotosis. Now I never say, "That's right or wrong," or "Where did you get that stupid idea?" What I say is, "Defend that for me." "Would you defend that logically for me so I can grade you on the analytical sense in your plan in the real world?" "Show me any journal article, or textbook, or basic principle that suggests that in a 60-year old lady the first thing you should think of is hemachromotosis when they are sixty and have a big liver."

Well, the student couldn't find any book or journal that said that was the first thing you should rule out. He said, "But, you get a big liver with hemachromatosis." I said, "Oh, I know you do." "You get a big liver for a thousand other reasons, too. What I want to know is, in this massive world of your ignorance where you couldn't possibly remember all the diseases and all the possibilities, why you chose this? I'm worried about what you do in the levels of your ignorance. What I'm wondering about is why, of all the things that could have been, you picked that?"

Well, the poor guy was in a frenzy because he couldn't defend what he had done. He said, "Well, suppose I had looked it up last night. I would just forget it." I said, "That wouldn't be any disaster. I will come back in an hour. Go get the book again. I don't care if you call up the Pope and have him give you the reference, but please, bring it to me. And, I don't care if you show it to me and it's perfect and you have got good statistical evidence. I couldn't care less if thirty seconds later you forget it, because the next time the patient comes in again with a big liver, you can look it up again. Because what is memory? Memory is usage. It's not IQ, it's not interest, it's usage. Call me up every night and you will soon know my number. Call me up once a year and I don't care if your IQ is 180, you're going to run out of dimes."

So when he finally could't defend it, I said, "Now, I'm not saying that you hurt the lady, or that it was bad care or good care. It's no sin not to know all the answers. The sin is to do things in a manner in which you do not grow wiser from what you do." That's been medicine's great sin. It's not handled data rigorously. And the reason they have gotten away with it in this country for the last 75 years is because none of the licensing examinations have dealt with the final product--with actual physician performance. Because of this doctors could live with their illusions for all these years. But we have recently gone from five billion to 150 billion dollars a year and the government is wondering what it's spending all its money on.

Certainly there is something fishy going on and I maintain it was in our educational structure and the way we examine people. If you examine for a core of knowledge, they will focus on teaching it. What does this do? Since knowledge is infinitely expanding, you catalyze specialization. And then when you specialize, you deal with the patient's problems out of context. And you try to diffuse the back pain without knowing about all these other problems, and you just get into lawsuits because it does not work.

So when we examined these students, the very, very best students that our educational system can give us, for thoroughness, reliability, analytical sense and efficiency, there wasn't a single person who could get P's in all the boxes. They are in their early twenties. They have been through everything American has to offer in the way of education. Many of them got very upset.

And so a student - I'll call her Carole - comes to me and says: "Now wait a minute. If I understand it, you mean that all I have to dr is get the library and the patient's record together with the patient. I can stop going to the CPCs, to the lectures, to the conferences. I can look it up and copy it right out of the book. It says, with a big liver you do this and that, I can write it down right here. And, I'm not cheating or anything. Is that it?" And I said, "That's all there is to it, Carole." But, "she said, "suppose I don't even know it the next day?" I said, "The patient doesn't care. If you do the right thing, the patient doesn't care if you called up the king of England. The patient doesn't care. But she'll be very upset if you did the wrong thing. It won't help her at all to say, "well, I got 98% on my exams. That's the only thing I didn't know. It's irrelevant to her."

Well, two weeks later there was Carole's chart. Look at it. One hundred percent. Ps in all the boxes. And she breathed this enormous sigh of relief and she said, "Oh, you have no idea what you've done for me." She said, "I was feeling so depressed at this whole thing: these big thick books, these endless exams. And then they are talking about self-assessment exams, continuing education...more and more exams. There are twelve thousand medical journals to learn from. I go the library. I try to study. I get depressed. I'm like the little old lady. I had twelve things to do. So the first thing I did was to take a nap and get that over with." And that's the way she reacted.

But now, take this man. His analytical sense was always way down towards the bottom. He was always doing things he couldn't defend. He would learn the word "endometriosis" on Monday, and on Tuesday, he would be using it as if he had known it all his life. He went to one of the East's leading universities--not too far from here. He had fantastic credentials. He went to a beautiful prep school. He was one of the top students in the first two years of medical school. He had won prizes. He was good at gymnastics... He really thought he had it made. But, then he found himself in the special class. He came storming in in a frenzy to me. He said, "You have no right doing this. This was completely unannounced. No one told us you were going to do this. You completely changed the ball game."

I said, "That's right, old boy. You were the star baseball player and we switched to tennis last night. And you're very, very upset. I can understand that."

"Well, I don't think you have any right to do it. I mean, you are making it look as though I am an idiot and Carole is some genius around here. And there's no evidence to support that."

I said, "Well...by your criteria...but let's stop worrying about evidence and prizes and criteria and exam schedules and so forth. Let us just say, supposing your own mother came in here tonight quite sick, and she was free to get sick in any way she wanted, with rare or common

problems in any specialty; no one would hand her a rulebook on what sickness she should have on Tuesday, whom would you want her to go to? Carole or you?"

"On the basis of these performance charts Carole has pretty well demonstrated that no matter what's wrong with her, she will figure it out. In the first place, Carole's very relaxed these days. She's got that wonderful smile, amd it would make your mother feel better just to see her. But, in the state you are in, you would make any patient sicker. You have got more anxiety than the patient." I said, "The first thing the patient needs is someone who is sort of with it in this world. You are all torn to pieces."

He said, "Well doctor, you keep putting things in these impossible ways. I mean you put me in an impossible position. You even talk about my own mother." I said, "Exactly. I'm focusing on your mother now instead of your ego. Why don't you just forget all this school stuff for a while, and for the next month, try it. Just go out and be thorough and reliable and never write another word you can't defend. Don't worry about any exams or missing the conferences. I know that you don't like to not go to the CPC and to spend all the time straightening out that record because Dr. So and So, the professor of the department, will notice that his little smart boy is not in the front row and you will pay a little price, because in the old paradigm, there's a whole group there putting on their show. And you won't be around to see it. But just try it. You can make it up there. They will just think you had a little illness or something...a little aberation."

Well, he was in a turmoil and went and stood in front of the door. And now I said, "You can't get out of this door, don't you leave this office until you smile. Come on...smile! The world is not coming to an end right now," and so he finally did.

And he went out and tried. And you know, it was incredible. After he pulled himself together, he got to be quite good. It took some doing. For example, he had to stop writing bull-shitty words which he could not defend.

And then he came to me a couple of months later and he said, "You know, I can't believe it. Here I go to a terrific prep school. I go to one of the best colleges. Then I come here at age 25, you tell me... you prove to me I'm not thorough. I'm not reliable. I write things I can't defend. You know this is a disaster."

And I said, "Well, it may be a disaster to you, but it's quite trivial to me. As nearly as I can tell the only thing that's hurt is your ego." I said, "Now my definition of a disaster would be if you were forty-three years old; you were in a law court, you were being sued for three million dollars; a mother of two small chilldren had been killed by a medication that you lost track of. That would be a true disaster and you could truly get upset at your educational system for allowing it to happen to you. And, you would be furious at the

> lawyer because you wouldn't want to defend what you did and you would be mad because you were asked to. Now you're being brought up so that you're education wise, to deal with ignorance, to not write anything that you can't defend and let anybody sue you because you have the record and you will be glad to defend it."

A look at the kinds of medical treatment that presently dominate our society quickly reveals that Larry Weed is talking about a new and very different kind of medicine. Under the present system, at one time or another in our lives, we are sure to suffer from the difficulty of being unable to find continuity of care between the physicians who will treat us. We seem to be caught in an age where, despite the run away cost of medical care, physicians are less easy to see and spend less and less time with their patients. Care is something we are almost "lucky" to receive. The mysterious physician may name our illness and then tell us what he will do for it. The chances that he or she would be willing to tell us why the disease is there, or why a treatment is prescribed, or why it is important that we ourselves have and understanding of our problems and take a responsibility for our own care,--all these chances are not very great.

The work of Larry Weed is predicated on the direct necessity of providing solutions to these problems. In the words of an anthropologist who has recently studied Weed's impact on medicine, Larry is attempting

> to educate a new physician and other health care providers who are patient-centered, team-oriented, scrupulously honest, demystified, relating to patients as mutual participants in a contract, capable of using new technologies in conjunction with their patients and never isolated from some kind of feedback that will show them the outcomes of their work. In this new medicine, the physician is far more accountable for his acts than heretofore and his ability to make wise decisions is valued more highly than the mere memorization of facts. In this new medicine, the illness of the patient is seen in a broader context than in traditional medicine. Included in the context are components of the patient's socio-cultural experience and psychological motivation.

This statement emphasizes another key aspect of Larry Weed's way of looking at medicine. It is not provider or physician-oriented, but patient-oriented. This is the chief premise of a large but easy-to-read book authored by Weed. Your Health Care and How To Manage It drives home the point, again and again, that, there is only one way for patients to be assured of medical care which will not suffer from the lapses caused by one provider not knowing what another has done or is doing: All patients must have copies of their own medical records--written and structured in such a way that the patients understand their problems and the reasons for the treatment plans that their doctors have prescribed for them. As Larry says, "Once the patient knows that he can have all the information about his problem, it will be like a big ball of twine. If anyone can get it unraveled, by sitting there and pulling at it all day, the patient will. There can be no one better motivated than the patient to get well." If the patient is not motivated, Larry urges us to get over our illusions that there is anything doctors can do to help him.

Nowhere is the patient-centered aspect of Weed's approach to medicine better illustrated than in the initial five steps of formulating treatment plans in the computerized PROMIS system. The computer, acting as a guide, suggests that the physician take "a broad view of the patient as a whole," asking "how he is sick, and how his everyday functions are compromised by the problem at hand?" To this end, the physician is reminded that he should state aims for the management of the problem--aims that should be set by physician and patient working together. The second step is taken when the physician and patient answer a series of questions designed to determine how the patient's particular problem is contributing to his sickness. These questions are designed to ask how sick the patient is and to elicit the pattern of the sickness.

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* Your Health Care (Essex Publishing Co: Essex Junction Vermont, 1978), may be obtained by sending five dollars plus $1.40 for postage and handling to the PROMIS Laboratory, Medical Center Hospital, Mary Fletcher Unit, Burlington, Vermont, 05401.

As the third step in planning, the physician ascertains the effects and disabilities produced by the problem, being always aware that, because of human uniqueness, what is incapacitating to one person may be only a minor inconvenience to another.

As a fourth point, because the human body is a complex mechanism comprised of a series of systems interlinked with each other, the physician is reminded to investigate how the problem is affecting the function of a larger bodily system such as respiration, digestion, blood circulation, etc.

Next the physician is to assess and to follow the course of the problem. The words on the computer screen are always there:

> If the problem indicators are changing rapidly, get them more often. If the curve is relatively flat and the patient is in no danger, then do not overuse laboratories and x-ray departments and medical personnel studying the obvious at great expense and discomfort to the patient.

The sixth step is the determination of the cause of the problem.* Most physicians begin with this step, which is tantamount to looking at the problem totally out of the context of the person it affects. A doctor who has gone through the preceding five steps will have a very personalized view of his patient and, the way in which he both goes about looking for the problem and treating it, should be a natural outgrowth of this process. Medicine, with the aid of the computer, has become individualized and personalized. There is no longer any such thing as "just another case of gallstones" that gets, axiomatically, the same routine treatment.

Thus, what Larry Weed is doing, is to create conditions under which medical care can become coordinated in its delivery and potentially less costly both because tests are not done unless absolutely necessary and because the physician is warned not to do something in treating one problem that will inad-

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*There are a total of eight steps. For reasons of space, a discussion of the final two steps has been omitted.

vertently complicate another. The random conveyor belt system of being passed on, from specialist to specialist, with tests repeated again and again becomes a thing of the past when the same patient record in electronic form is available to all health care providers. With patient records uniformly structured and readily available, nurses can read and follow the reasoning of physicians. When something in a treatment plan seems out of place, the nurse can call it to the physician's attention.* The pharmacy and radiology lab are also tuned into the same patient record. They too have equal opportunity to spot problems. As Weed says, "Medicine, for the first time is delivered by well-coordinated team work. Everyone is helping everyone else. Every piece can fall into place. We can all walk by the living room table and drop a piece in the cross-word puzzle. It's got structure and we know what we're doing. When it's all done, we all did it." No one person did everything. Instead we all delivered our individual portions of coordinated care.

What Weed is doing--if it is given a chance to catch on and to spread--means that doctors must ultimately be trained and educated differently. Perhaps we can go on producing research specialists in the same way, but practitioners will be a different breed. Under a restructured medical curriculum, it should be possible to train more of these for less expense. With the increasing availability of the computer guidance system, we will bring top quality care to more people without the increased runaway expense of more and more physicians providing "care" that all too often is tantamount to hit-or-miss guesswork. The guidance system is designed to show the physician and patient how to work together to avoid <u>all</u> unnecessary expense.

Larry openly acknowledges the revolutionary implications behind these changes when he writes in <u>Your Health Care and How To Manage It</u>:

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* It must be emphasized again that this aspect has been a source of physician resistance to the use of the system.

> To the extent that we equate good service with credentials--and [create a situation in which] only a limited number of people can get these credentials, [one in which] they, in turn, can set high prices on their services--we increase medical costs. To the extent that "experts" are defined as those who create guidance tools--that intelligent non-credentialed people can use, then costs can be lowered. Also, to the extent that we audit performance against well-defined rules and then open up medical practice to anyone who performs well, we may find large numbers of people who are competent and willing to live on far less than physician's salaries for the services they perform. For those who say that there is something that a human, caring physician gives beyond intellectual guidance, we can only say that this element of care is not something we should be limiting with credentials or fees. "Caring" at a price is hardly caring. The extent to which we deeply care is not fostered by formal education and credentials, as much as by many other factors in our society.

Larry Weed has had a profound effect on those whom he has taught. It cannot be too deeply emphasized that he is a man who "teaches" wherever he goes. The anthropologist* who studied Weed and the problem-oriented medical record writes that he knows "several physicians who left both residency and academic positions to commit themselves to problem-oriented medical record education as 'missionary' work." It certainly takes a very special kind of magnetism to bring about this kind of change in people's lives. But, Larry's charismatic personality and the magnitude of the importance of his work exert a powerful influence on many persons. Consider the reaction of some of the physicians who have been trained by Weed in Vermont. According to the anthropologist:

> One resident described an audit of his actions by Weed: "When Weed audits you, it's not frustrating." I asked him why that was so. He responded: "It's his charisma, his genius, his humanity, his imagination, that is fantastic about the POMR." Another second-year resident echoed this comment. "When people use the record in Vermont, there is a way of thinking and looking that helps you. Weed has given us a philosophy of science. "SOAP" is not the record. That's just the style. The approach is different. Weed goes beyond that. What Weed is saying is, "What is the logic of medicine?" This is what Weed stresses. Weed has given us a tool, an ability to systematize. Weed has given us the ability, a chance to change the method of looking at patients. That's his greatness. A third resident summed up Weed's

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* referred to above

impact on him by stating: "There is no comparison to me, between the old method and the new. I now have an approach to life. This is because of Weed."

So much for the man who is making what may be the twentieth century's greatest impact on medicine and medical care. The use of the paper and pencil POMR has spread, according to some, like "wildfire." In 1972, both the Veteran's Administration Hospital system and the Health Services Administration mandated its use, system-wide.* In 1978, it is being taught in 90% of our medical schools. Change is on the way, but it pales in comparison with the kind of change that the computerized POMR can bring.

The PROMIS terminals run on cable TV technology. Like cable television, they could be hooked up to the central computers and their memory banks. Consequently, the terminal could soon be in the office of every neighborhood doctor, in every group practice, every health clinic, every HMO and on every ward of every hospital. The best research minds in the country could be continually updating and refining the data base on which the computers operate. The best analytic minds, freed from memory dependence, could grow more and more refined in their ability to use the terminals to elicit the most rigorous guidance possible in delivering the highest possible quality of care. Because the system could audit itself, we would, for the first time, get massively detailed information on what kinds of treatment for each given disease elicited the best results. We would, in our deeds and reality, be growing wiser from what we had done.

All this is an attainable possibility within the next decade. It has been made attainable and possible both by the charismatic genius of Larry Weed and by the inspired work of his team of medical providers, medical librarians, and computer specialists laboring in the isolation and beauty of northern Vermont.

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* The VA is currently retreating from this use because of political problems. While many physicians are enthusiastic about the POMR others, generally older, are very set in their ways and have strenuously resisted the changes brought by the POMR.

Dr. Weed's work, if massively disseminated, would demand far-reaching changes in our medical schools, hospitals, clinics, and doctor's offices. The present system of provider-centered health care is satisfying the demands of the providers. No one notices physicians complaining about their poverty. The system, as now constructed, is handsomely benefiting them. They have little reason to change the rules of the ballgame to order to make it patient-centered. Yet Larry's work demonstrates that this is what must be done if the cost of health care is not to bankrupt us all. Change, it may be predicted, will not come until the public understands what is at stake and insists on action.

In this respect it is a singular irony that the achievements of Larry Weed, while widely-known among the medical community, are virtually unknown to an American public that, saddled with the burden of the skyrocketing costs of a chaotic healthcare system, should have every reason to insist on the benefits to be derived from Larry's work. However, it's even more ironic to note that all that stands in the way of the rewards to be gained from what Weed and the PROMIS Laboratory have done is human resistance to change.

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* Quotations on pp. 15,19, and 20 from John Henry Pfifferling, "Records and Revitalization: The Problem Oriented Medical Record in A Clinical Setting" Ph.D. Dissertation, Department of Anthropology, The Pennsylvania State University, 1977.

QUOTABLE QUOTES

One of the worst things a doctor can do is to create a dependency state. One of the best ways to make sure a doctor does not do this is for him to give patients copies of their records and to make sure they understand what's on them.

Medicine has specialized. But the patient doesn't specialize. You don't have a uterus come in to see you all by itself.

If you ran a hardware store the way we run medical schools, it would take eight years to train a clerk. She'd have to have a course in screws and one in shovels and take her self-assessment exam in screwdrivers. And then after eight years, you'd say to her: "Can you run the hardware store?" And she'd say, "I can only run the hammer counter -- that's my specialty." But only one percent of the people want hammers. So what's she going to do? She's either going to give 99 percent of the people the wrong product, in which case the store will defraud, or she will say I don't know and they'll all leave and she'll deal with only one percent of the clientele, and the place will go bankrupt. She will either have bankruptcy or fraud. Medicine's got both because of the memory-based system.

The very tool (the computer) they use to do their work tells them how to do it correctly.

Francis Bacon said, "Truth emerges from error." Wheeler said, "Make your errors as fast as possible," keep track of what you're doing and you'll get smarter.

Time, tasks, and levels of achievement. In all areas of life we have three things to play with. We could have made time the variable, tasks the variable and level of achievement, the constant. But schools in general have made level of achievement the variable, time the constant, and tasks the constant. They all went to high school; they all took five courses; they all stopped in June. You'll get an "A," you a "B," and you a "C." We didn't have to do that. This society didn't have to run that way. It could have said, we'll make level of achievement the constant, and since all people are unique, there are never two people alike, in spite of all that's said about equality--something's gotta give. So you'll do fewer or more things, in more or less time, but you'll stick at it until it's done right, and you'll fulfill the committments you make. Is that clear? I don't care whether you take one course or five. Make up your mind. I don't care whether you work on it five days of the week, or five months out of the year, but you better do it right.

Society doesn't care for that cabinet-maker up in Jericho. It couldn't care less if I'm going up there and this guy is going to make a cherry cabinet with this many drawers; it's going to cost this much and everything; and on the way out my wife says, "Did you know he's an Olympic skier and his wife is Miss America, and he's a Rhodes' scholar?" All this is interesting. But, if the cabinet isn't exactly what he

promised, I'm going to say, "I wish he'd give up Sanskrit and do his work." And, by the same token, if it's precisely what I want, I don't care if he's a hermit, and a pervert, and 15,000 other things, and never went to school at all.

If this society did nothing but turn out children--some that did one thing, others that did five things, others that did twenty--but whatever was done, was done beautifully, this society would be a dream. Instead, most of the time we're trying to clean up messes that never should have happened in the first place, because some kids have gone through school with time and tasks as the constant and achievement the variable, and from age 6 to 26, they have never had any grades besides a "C," a "D," or an "F." They never had the feeling of doing anything well. And morale is achievement and achievement is a well-defined goal of doing something of which you can be proud.

They've been denied that for ten or twelve or fifteen years. No wonder they get into high school and take dope and drink. It's a very demoralizing thing. Just when some of the kids are ready to catch on, they say, "This course is over. On to the next course."

What people should leave school with is a certificate that states what they do well. Some will have more things than others and it might say that what took one person a year to learn to do well, took another ten years. But, if he does it well and will produce it dependably every time, it's no longer relevant to me that it took him one year to do it and the other guy ten years.